
National Aeronautics and Space Administration**INTERNATIONAL ULTRAVIOLET EXPLORER OBSERVING PROGRAM****Final Technical Report for NASA Grant NAG5-1808**

6P

Title of Research: IUE Observations of a New Planetary
Nebula Central Star Candidate

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(NASA-CR-193682) IUE OBSERVATIONS
OF A NEW PLANETARY NEBULA CENTRAL
STAR CANDIDATE Final Technical
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The star CD-41°13967 has been discovered by McCarthy *et al.* 1991 to be the central star of a young planetary nebula. IUE spectroscopy was obtained with the goal of fitting a model atmosphere to the spectral energy distribution. Echelle spectroscopy was obtained in order to try to fit the wind outflow to Kudritzki's new set of unified model atmospheres.

The star is well detected in the low resolution IUE spectra with flux seen past Lyman alpha. We have not yet fit the model atmosphere, but expect that the main uncertainties will be reddening and flux calibration of the IUE spectrum.

The echelle spectra (Figs. 1-3) show 3 types of features: (1) broad stellar absorption features (Si IV at 1292 and 1402); (2) possible outflow absorption due to the stellar wind (Si II at 1304.5 and blueward, CIII 1335); and (3) interstellar features of Fe II, Mg II, Mn II and S II; narrow lines illustrated mainly in Figure 2. The galactic coordinates ($l=359^\circ$, $b=-33.5^\circ$) suggest that this object is a member of the outer galactic bulge or inner halo, a possibility reinforced by its large radial velocity of -97 km/sec (McCarthy *et al.* 1991). It is not surprising that we find a large number of interstellar lines of high ionization in the spectrum of this object. Many of the halo lines identified by Savage *et al.* (1993) are clearly seen in this object. After a new reduction algorithm is in place (see below) we hope to measure equivalent widths and radial velocities for these lines.

Unfortunately, the standard IUE reduction has misplaced the background and the data must be reduced with new algorithms. This is particularly noticeable at Lyman alpha, where the background is clearly oversubtract. We cannot conduct quantitative analysis (e.g. equivalent width measurement) until we solve this and several other problems with the data.

It is also unfortunate that proposals for additional data have been declined, since the current data are lower S/N than would be desirable. We hope to develop optimal extraction techniques to better extract and coadd the echelle data (including

order overlap region) to boost the S/N to approximately 30. The photowrites clearly show detected flux and line absorption blueward of Lyman alpha in the SWP echelle; the extracted data loses this due to misplacement of the background. Given the high resolution of the echelle data, it should also be easy to completely clean reseaus and cosmic rays from the data without loss of information. We have not yet attended to this at the time of writing this report.

Austin Tomaney has recently arrived at Columbia University and will be working on improved software for the reduction of echelle data. We hope to employ his software to reprocess the IUE echelle spectra into a form suitable for equivalent width measurement and model atmosphere fitting.

References:

- McCarthy, J.K., Rich, R.M., Becker, S.R., Butler, K., Husfeld, D., and Groth, H.G.
1991, *Ap.J.*, **371** 380.
- Savage, B.D., Lu, Limin, Bahcall, J.N. *et al.* 1993, *Ap.J* (in press); *Keyproject Preprint Series: 92/03*.

SWP42958 Read: 1991 UT Day 305 04:14:36

swp 42958 cd-41 13967x 180 minx hi disp \times lgap

observerx rich idx pnnrr 31 oct 1991 day 304

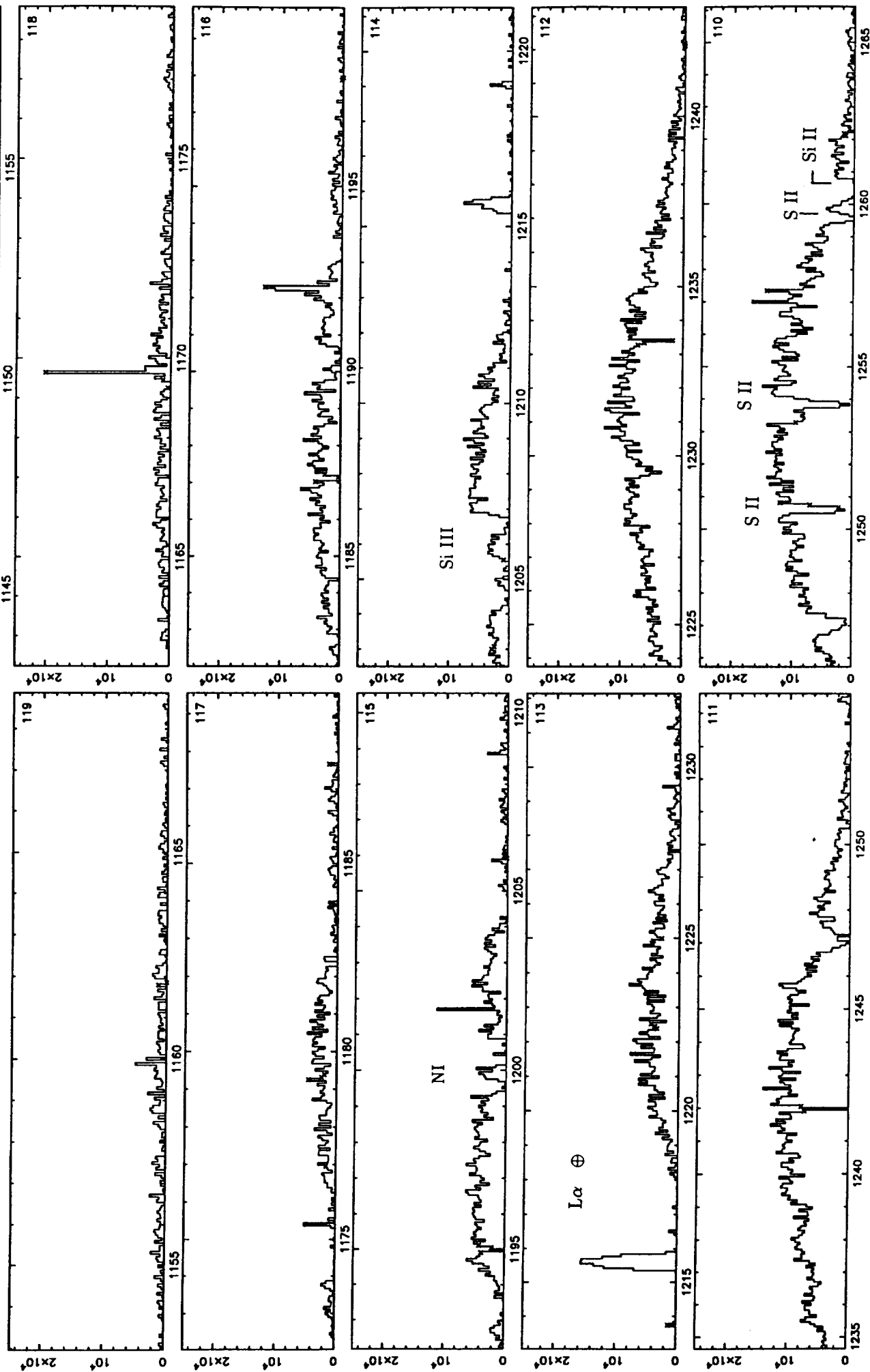


FIG. 1

SWP42958 Read: 1991 UT Day 305 04:14:36

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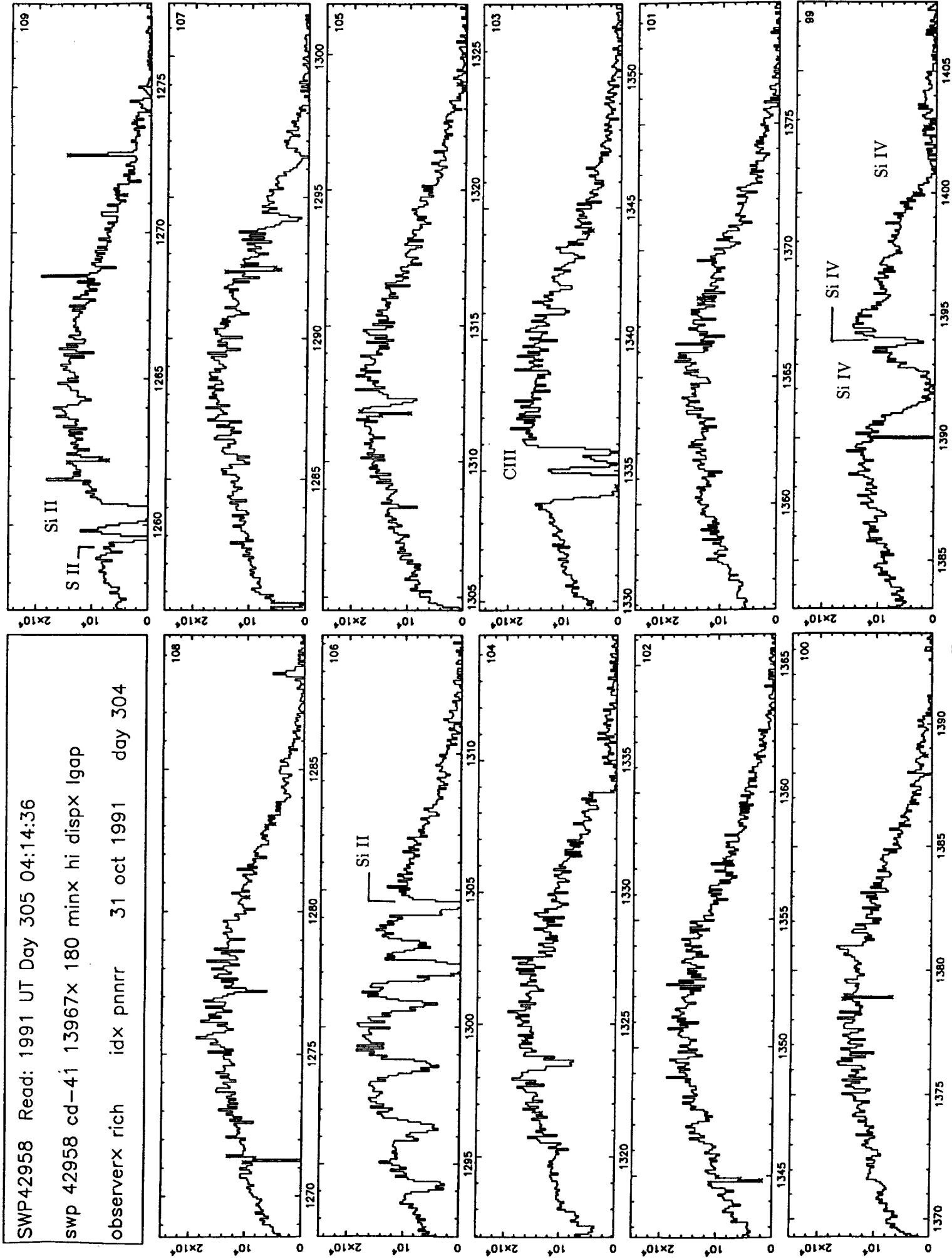


FIG. 2

LWP21600 Read: 1991 UT Day 305 01:18:15

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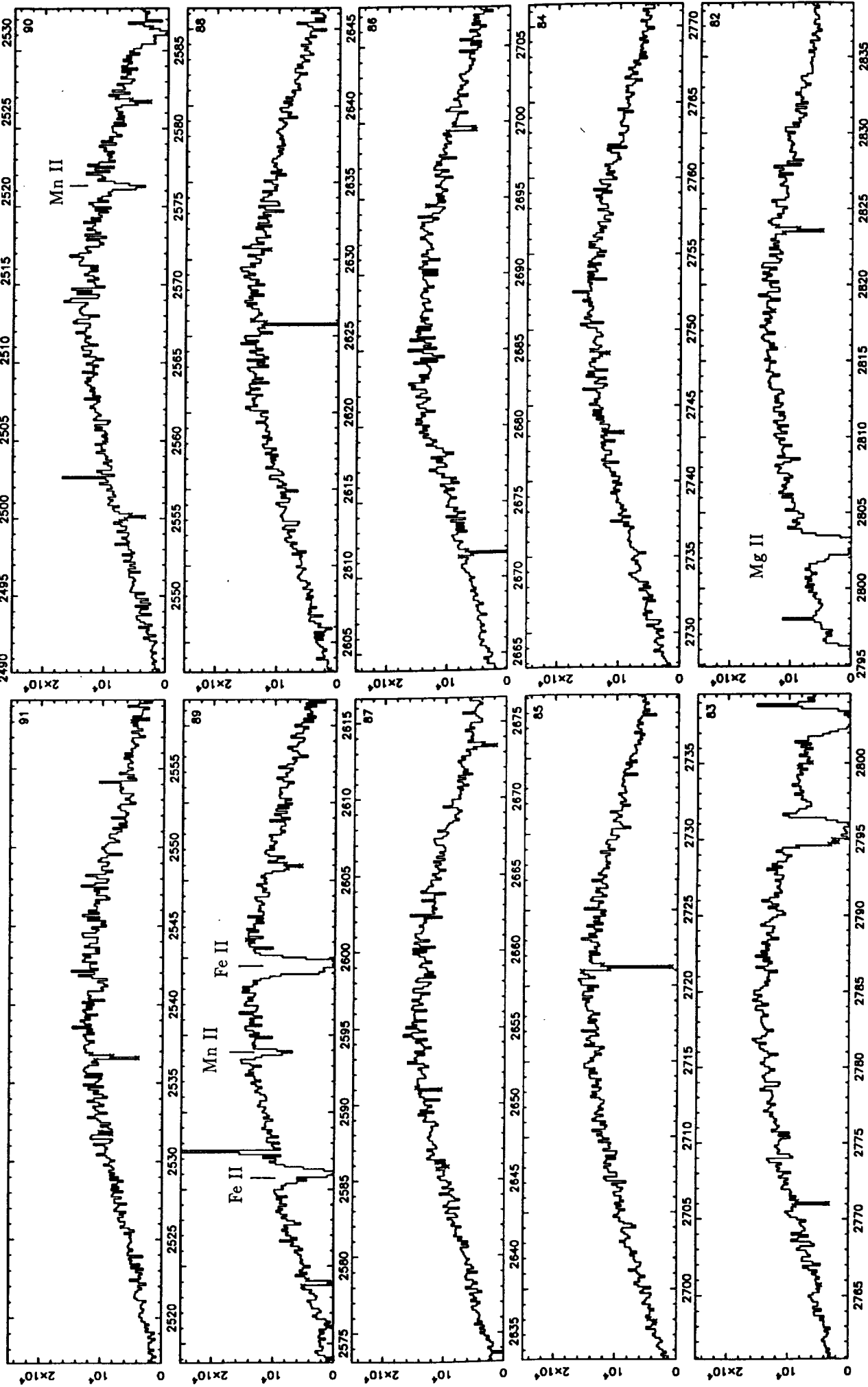


FIG. 3